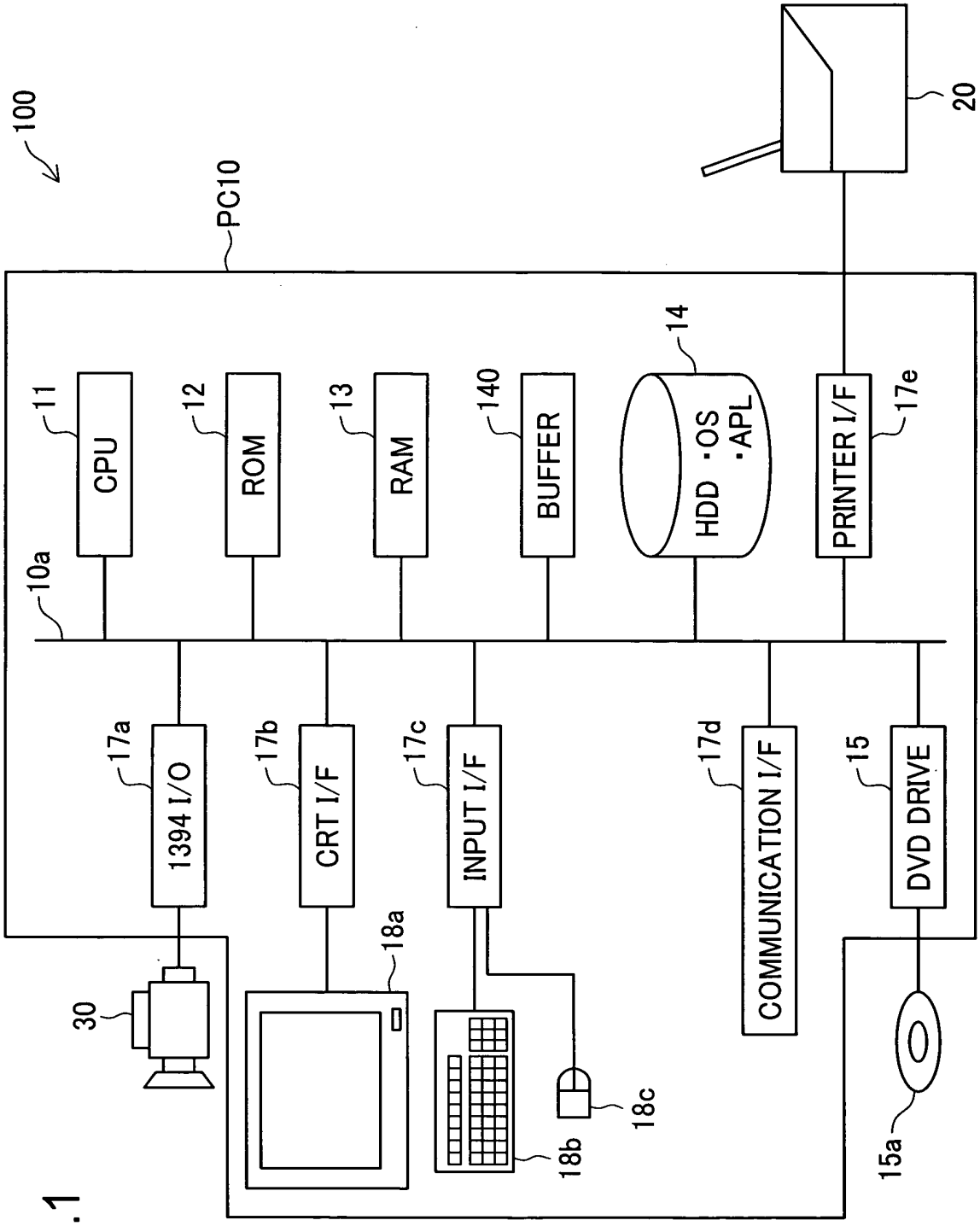

100
PC10
20
11
CPU
12
ROM
13
RAM
140
BUFFER
14
HDD ・OS
・APL
PRINTER I/F
17e
10a
17a
1394 I/O
17b
CRT I/F
17c
INPUT I/F
17d
COMMUNICATION I/F
15
DVD DRIVE
30
18a
18b
18c
15a

Fig.1

Fig.2

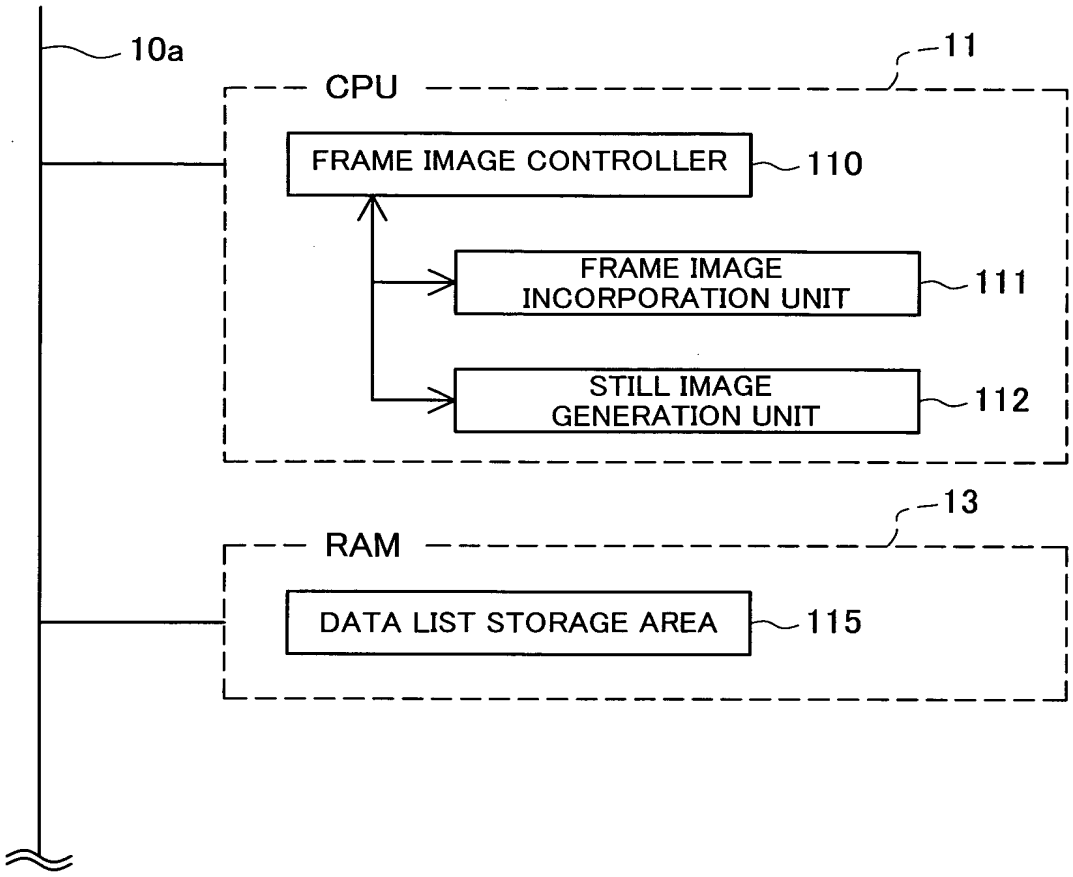

10a
11
CPU
FRAME IMAGE CONTROLLER
110
FRAME IMAGE INCORPORATION UNIT
111
STILL IMAGE GENERATION UNIT
112
13
RAM
DATA LIST STORAGE AREA
115

Fig.3

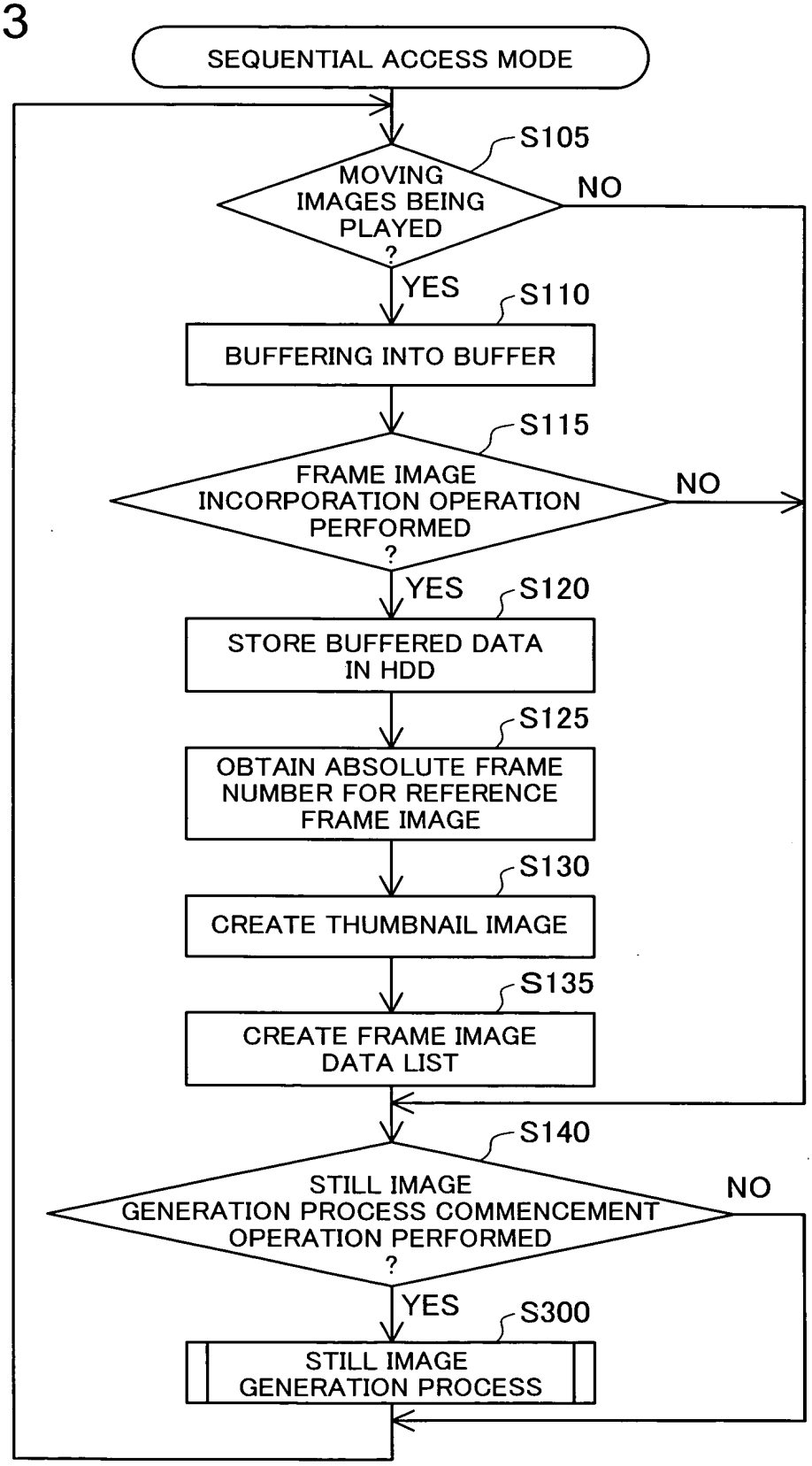

SEQUENTIAL ACCESS MODE
S105
MOVING IMAGES BEING PLAYED ?
NO
YES
S110
BUFFERING INTO BUFFER
S115
FRAME IMAGE INCORPORATION OPERATION PERFORMED ?
NO
YES
S120
STORE BUFFERED DATA IN HDD
S125
OBTAIN ABSOLUTE FRAME NUMBER FOR REFERENCE FRAME IMAGE
S130
CREATE THUMBNAIL IMAGE
S135
CREATE FRAME IMAGE DATA LIST
S140
STILL IMAGE GENERATION PROCESS COMMENCEMENT OPERATION PERFORMED ?
NO
YES
S300
STILL IMAGE GENERATION PROCESS

Fig.4

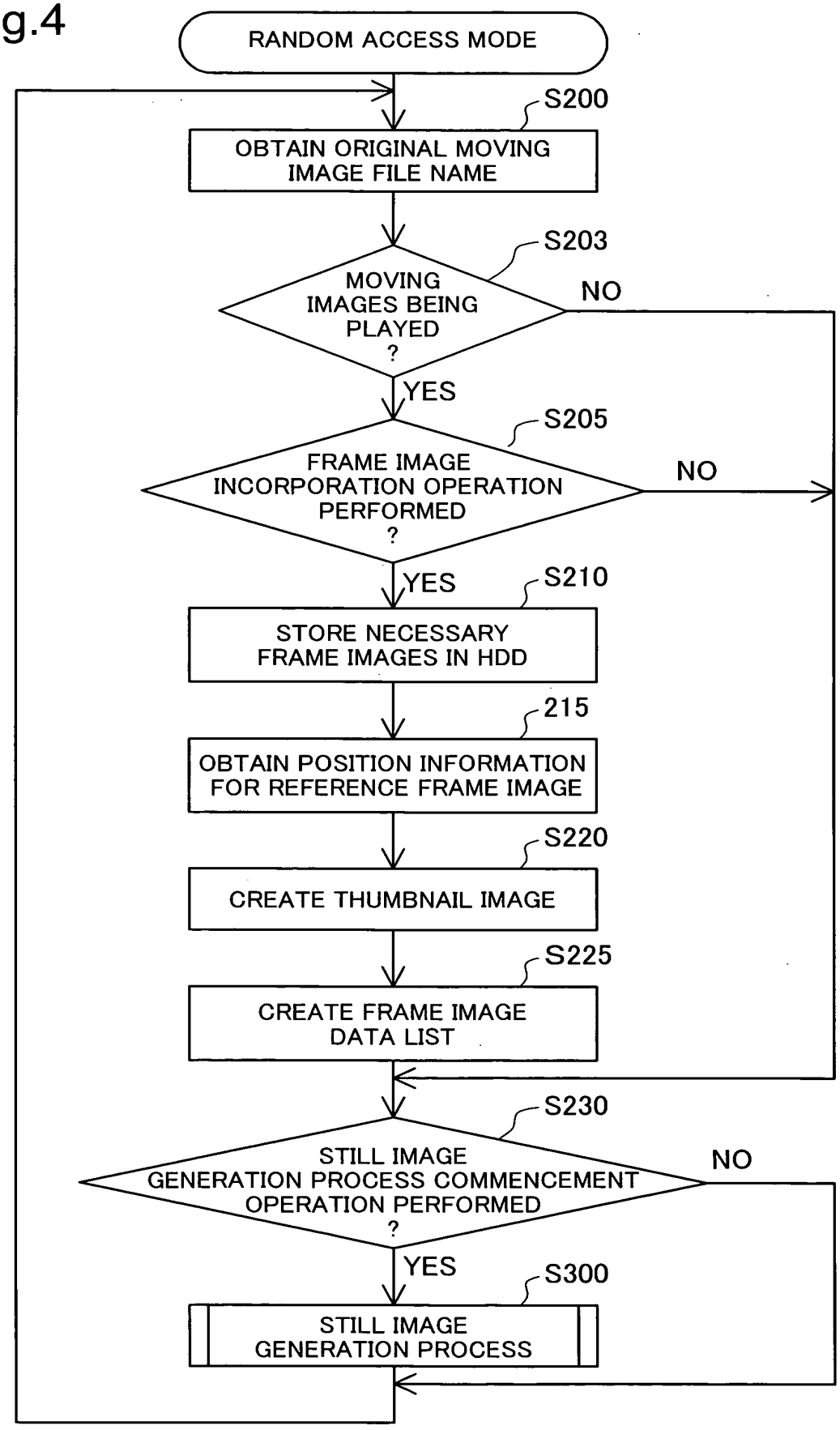
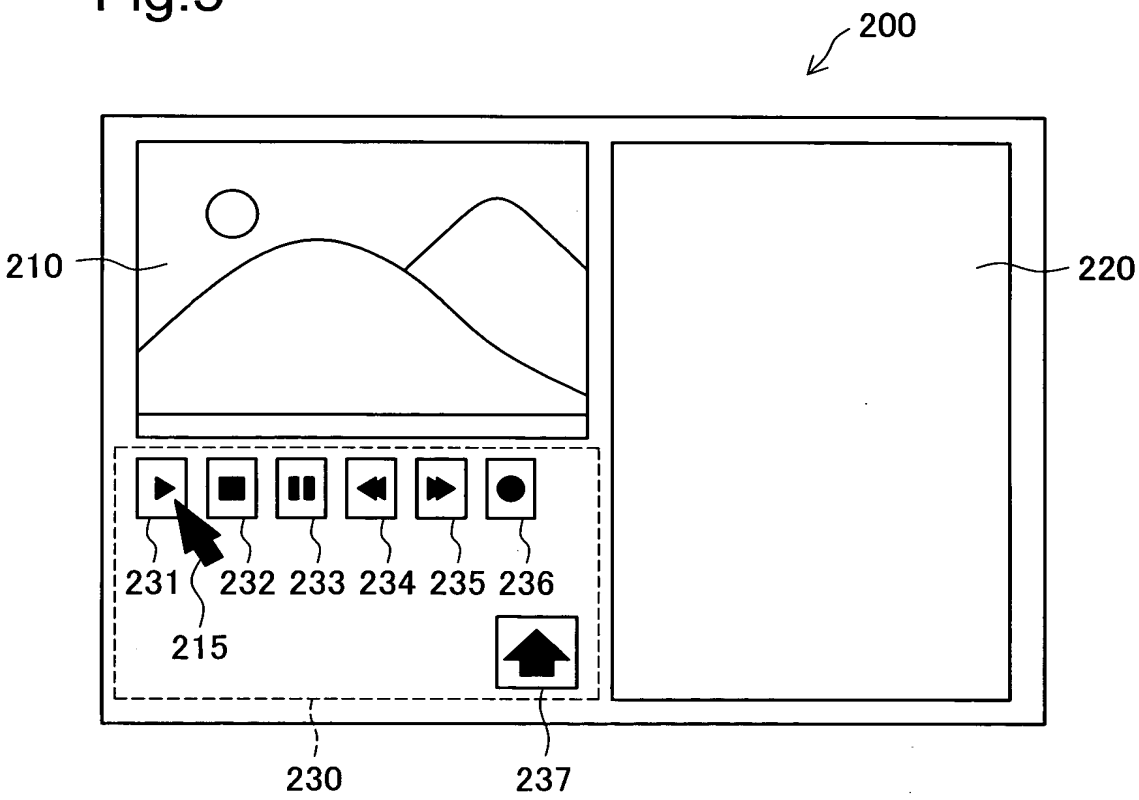

RANDOM ACCESS MODE
S200
OBTAIN ORIGINAL MOVING IMAGE FILE NAME
S203
MOVING IMAGES BEING PLAYED ?
NO
YES
S205
FRAME IMAGE INCORPORATION OPERATION PERFORMED ?
NO
YES
S210
STORE NECESSARY FRAME IMAGES IN HDD
215
OBTAIN POSITION INFORMATION FOR REFERENCE FRAME IMAGE
S220
CREATE THUMBNAIL IMAGE
S225
CREATE FRAME IMAGE DATA LIST
S230
STILL IMAGE GENERATION PROCESS COMMENCEMENT OPERATION PERFORMED ?
NO
YES
S300
STILL IMAGE GENERATION PROCESS

Fig.5



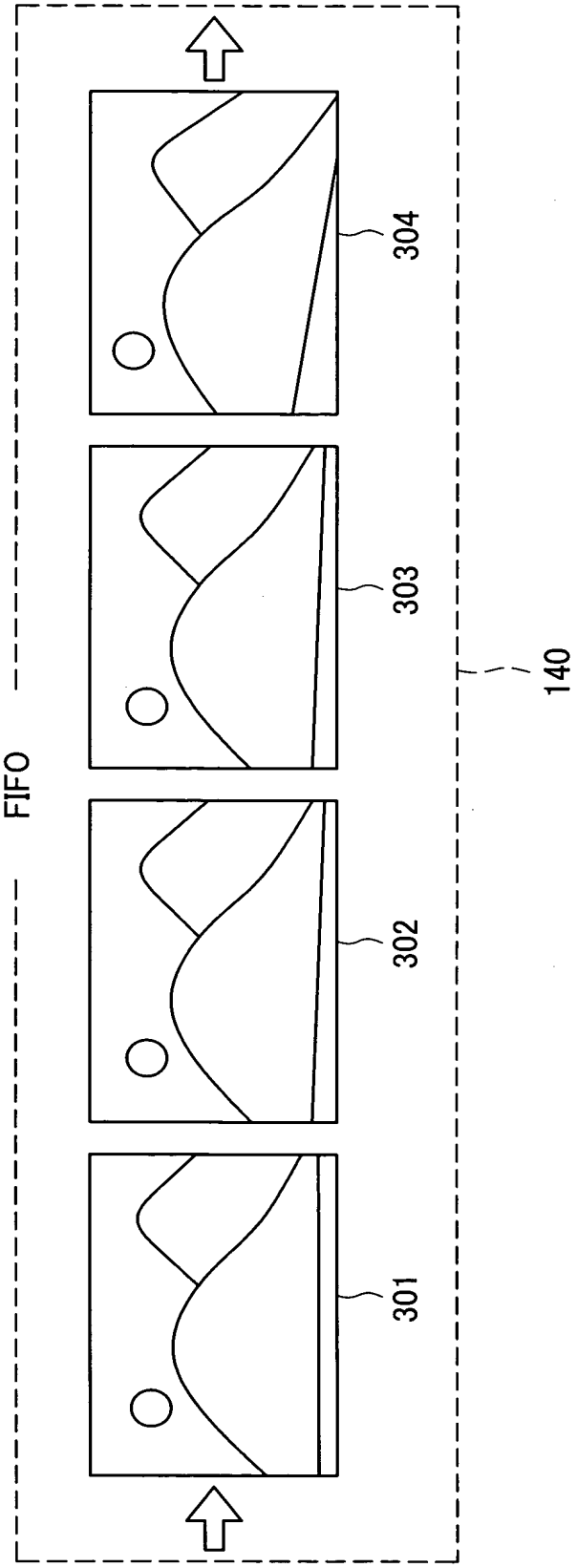


Fig.6

Fig.7

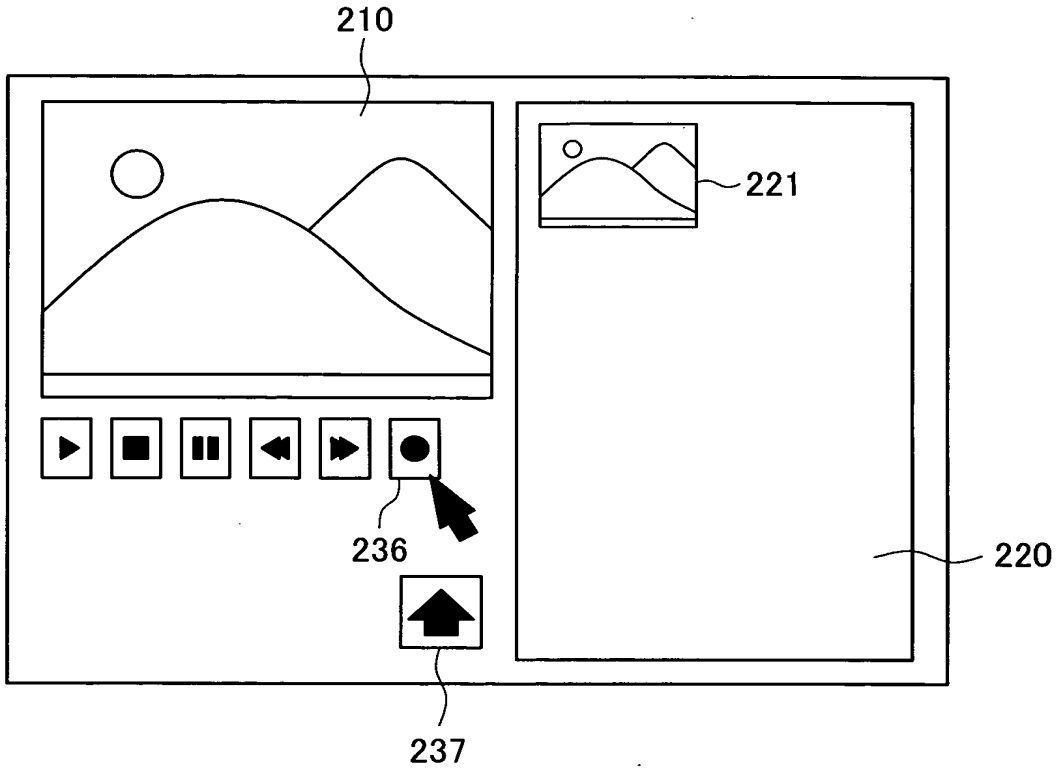


Fig.8(a)

FRAME IMAGE DATA LIST ITEM	DESCRIPTION
FRAME IMAGE ACQUISITION NUMBER	1
ORIGINAL MOVING IMAGE FILE FORMAT TYPE NUMBER	2
ORIGINAL MOVING IMAGE FILE NAME	(NULL)
ORIGINAL MOVING IMAGE POSITION	300
THUMBNAIL IMAGE DATA	80 × 60 BITMAP ACTUAL
STILL IMAGE 1	C:¥. . . ¥Tmp0001. jpg
STILL IMAGE 2	C:¥. . . ¥Tmp0002. jpg
STILL IMAGE 3	C:¥. . . ¥Tmp0003. jpg
STILL IMAGE 4	C:¥. . . ¥Tmp0004. jpg
PROCESSING TYPE NUMBER	0
TWO-FRAME SYNTHESIS RESULT	(NULL)
FOUR-FRAME SYNTHESIS RESULT	(NULL)
ONE-FRAME SYNTHESIS RESULT	(NULL)

Fig.8(b) ORIGINAL MOVING IMAGE FILE FORMAT TYPE NUMBER

ORIGINAL MOVING IMAGE FILE FORMAT TYPE NUMBER - DESCRIPTION	NUMBER
RANDOM ACCESS	1
SEQUENTIAL ACCESS	2

Fig.8(c) PROCESSING TYPE NUMBER

PROCESS IDENTIFIER - DESCRIPTION	NUMBER
NO IMAGE PROCESSING	0
TWO-FRAME SYNTHESIS	2
FOUR-FRAME SYNTHESIS	4
ONE-FRAME SYNTHESIS	1

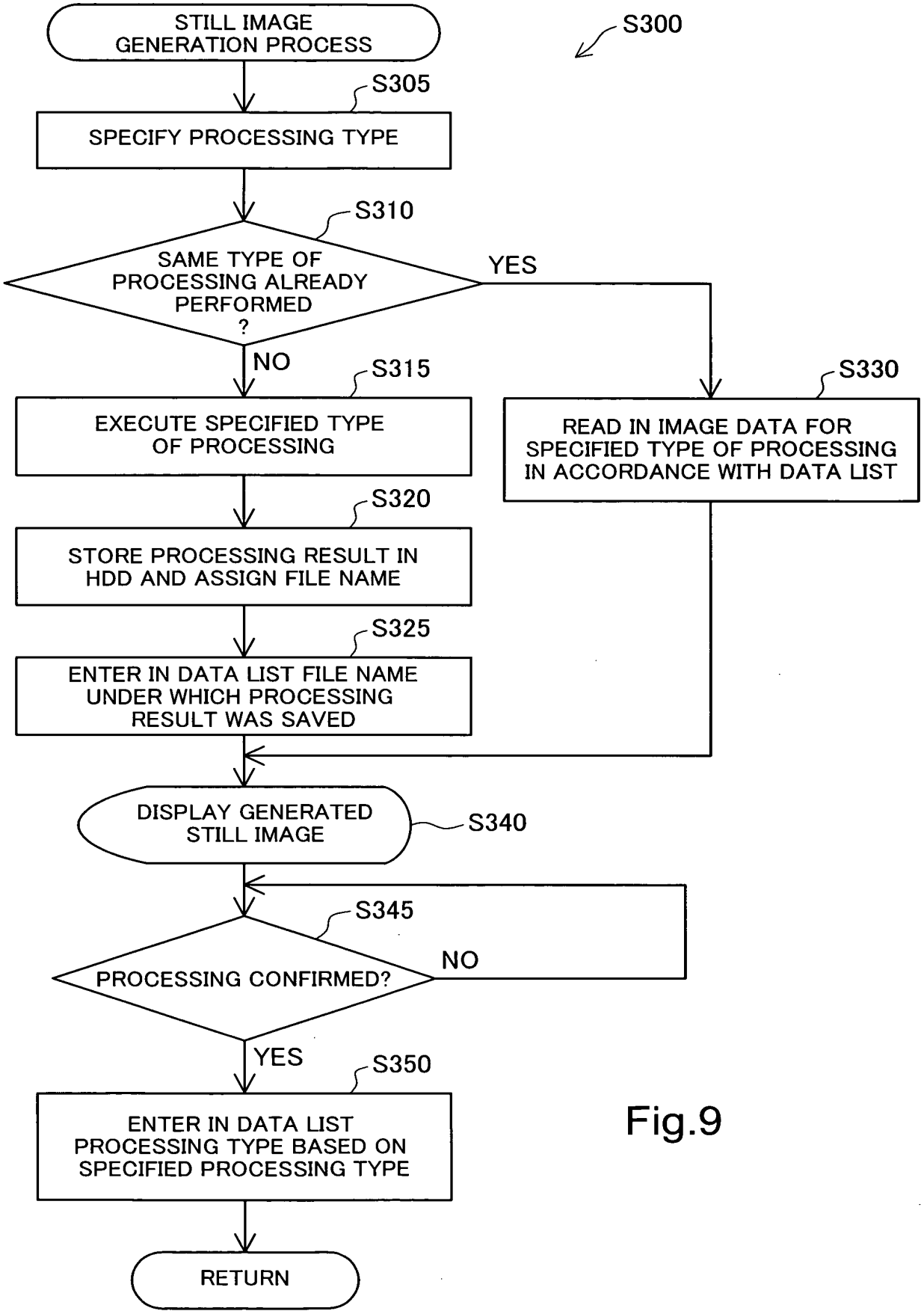

STILL IMAGE GENERATION PROCESS
S300
S305
SPECIFY PROCESSING TYPE
S310
SAME TYPE OF PROCESSING ALREADY PERFORMED ?
YES
NO
S315
EXECUTE SPECIFIED TYPE OF PROCESSING
S320
STORE PROCESSING RESULT IN HDD AND ASSIGN FILE NAME
S325
ENTER IN DATA LIST FILE NAME UNDER WHICH PROCESSING RESULT WAS SAVED
S330
READ IN IMAGE DATA FOR SPECIFIED TYPE OF PROCESSING IN ACCORDANCE WITH DATA LIST
DISPLAY GENERATED STILL IMAGE
S340
S345
PROCESSING CONFIRMED?
NO
YES
S350
ENTER IN DATA LIST PROCESSING TYPE BASED ON SPECIFIED PROCESSING TYPE
RETURN

Fig.9

Fig.10(a)

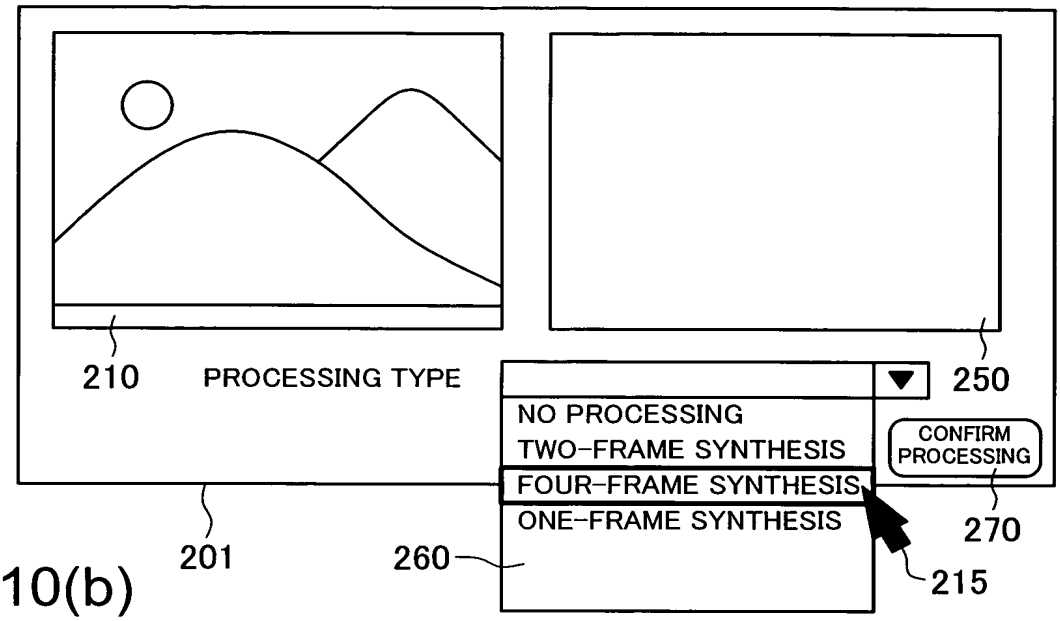


Fig.10(b)

FRAME IMAGE DATA LIST ITEM	DESCRIPTION
FRAME IMAGE ACQUISITION NUMBER	1
ORIGINAL MOVING IMAGE FILE FORMAT TYPE NUMBER	2
ORIGINAL MOVING IMAGE FILE NAME	(NULL)
ORIGINAL MOVING IMAGE POSITION	300
THUMBNAIL IMAGE DATA	80 × 60 BITMAP ACTUAL DATA
STILL IMAGE 1	C:¥. . . ¥Tmp0001. jpg
STILL IMAGE 2	C:¥. . . ¥Tmp0002. jpg
STILL IMAGE 3	C:¥. . . ¥Tmp0003. jpg
STILL IMAGE 4	C:¥. . . ¥Tmp0004. jpg
PROCESSING TYPE NUMBER	4
TWO-FRAME SYNTHESIS RESULT	(NULL)
FOUR-FRAME SYNTHESIS RESULT	C:¥. . . ¥Mc0001. jpg
ONE-FRAME SYNTHESIS RESULT	(NULL)

Fig.10(c)

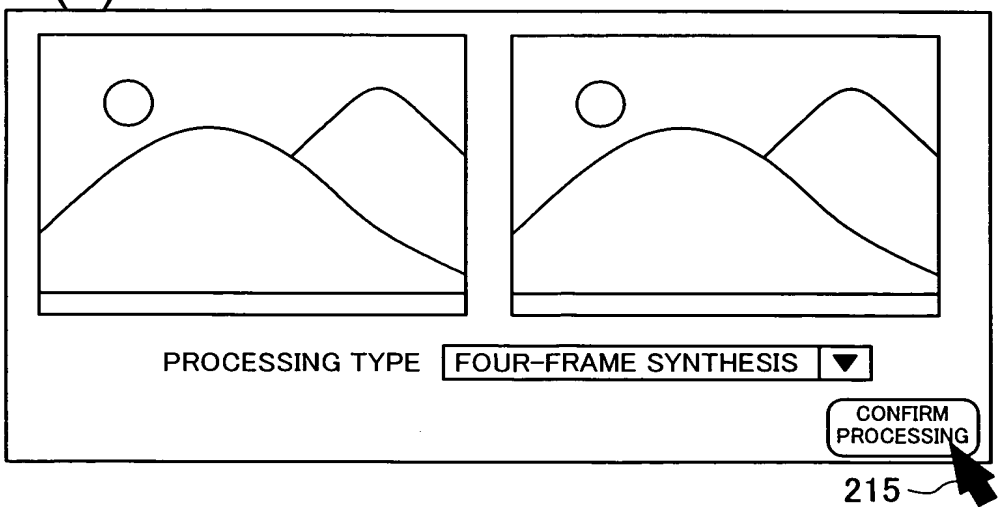


Fig.11

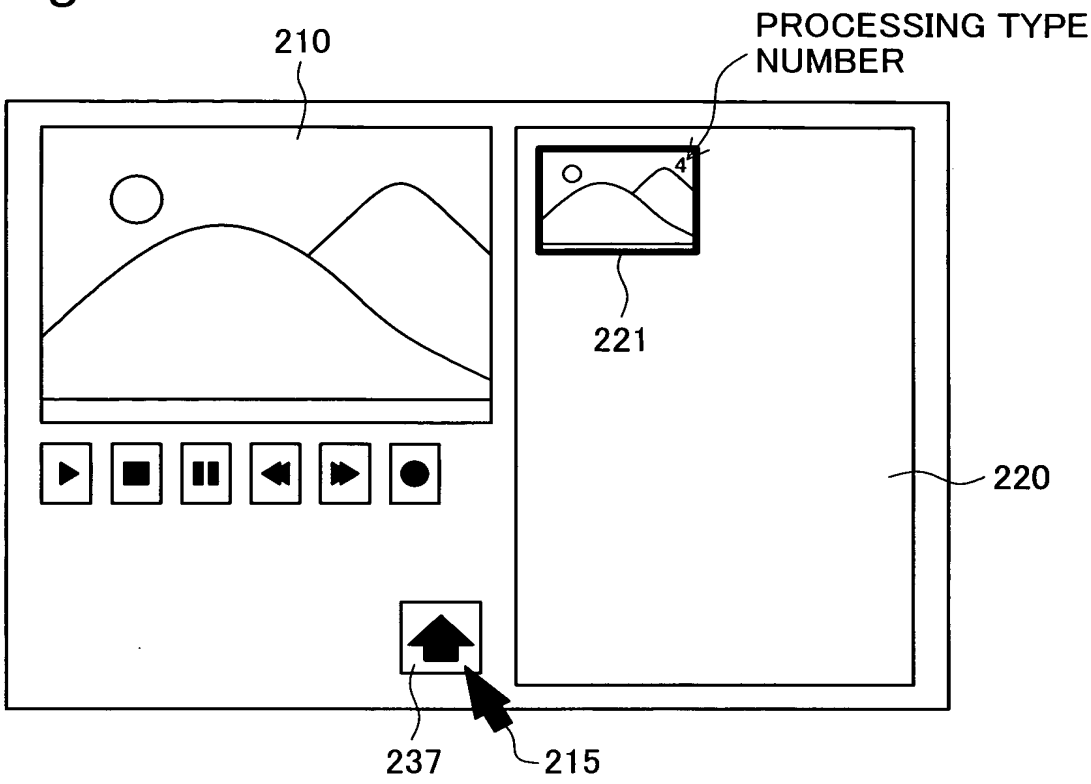


Fig.12

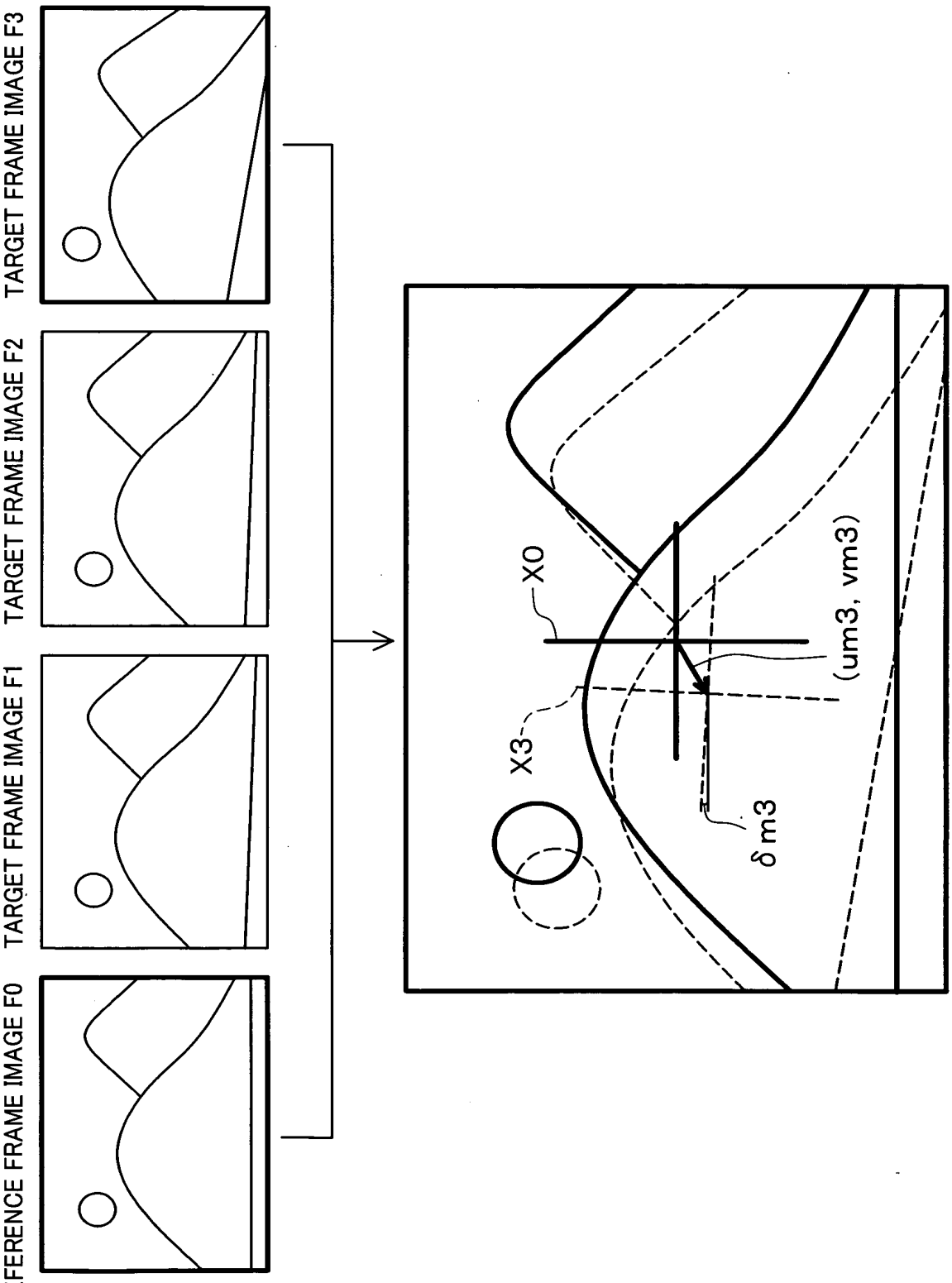

REFERENCE FRAME IMAGE F0
TARGET FRAME IMAGE F1
TARGET FRAME IMAGE F2
TARGET FRAME IMAGE F3
X0
X3
(um3, vm3)
δm3

Fig.13

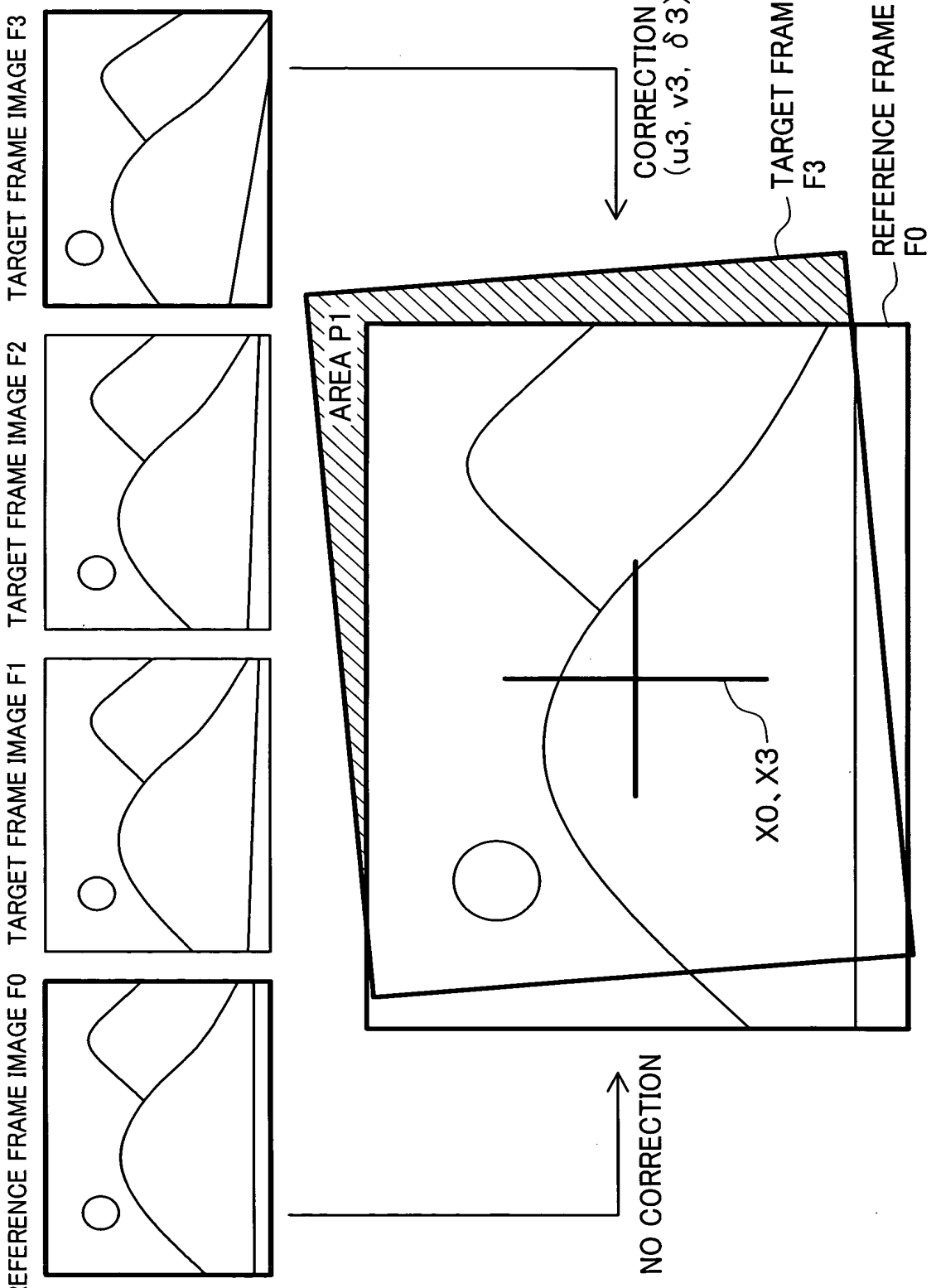
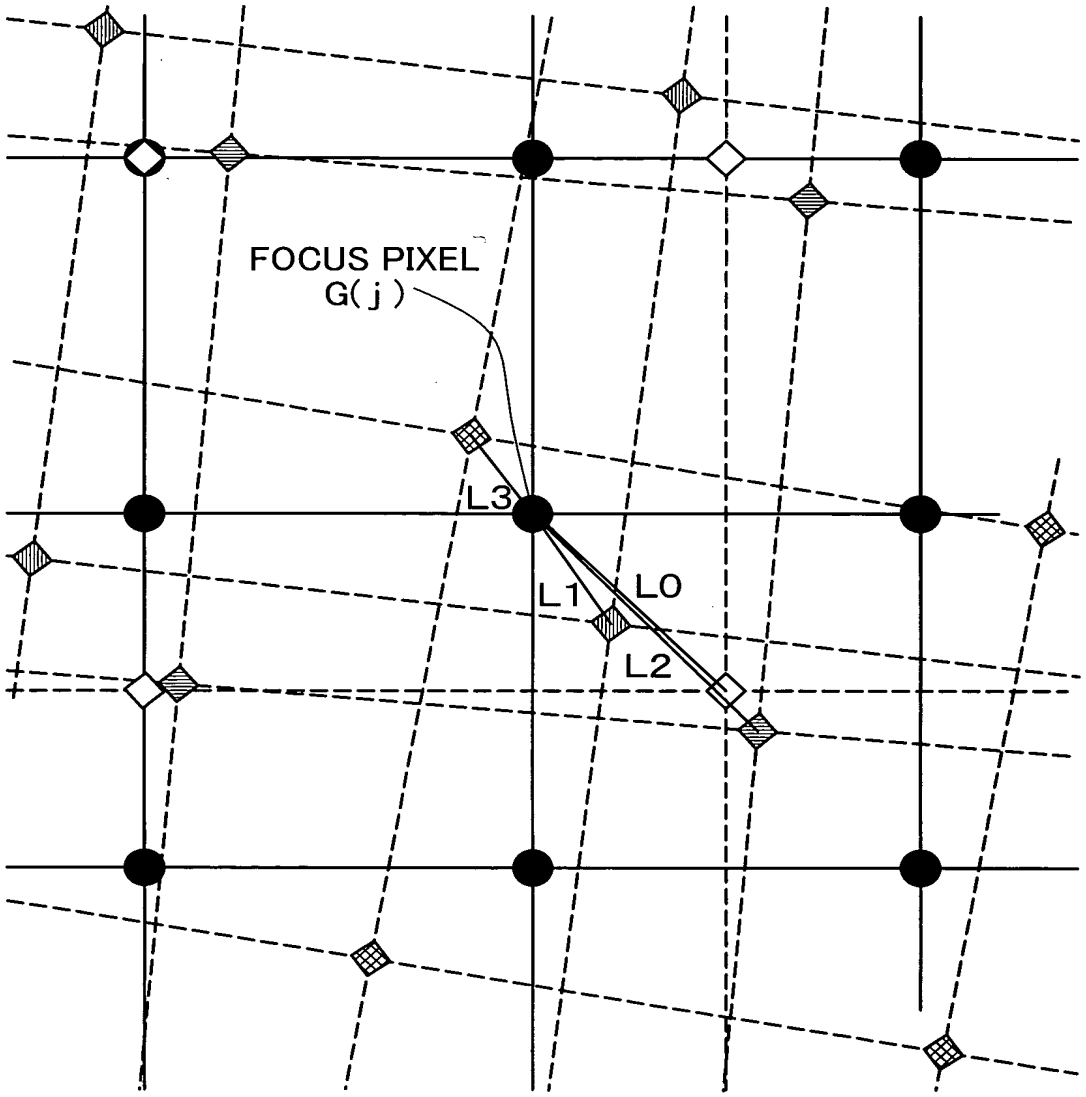

REFERENCE FRAME IMAGE F0
TARGET FRAME IMAGE F1
TARGET FRAME IMAGE F2
TARGET FRAME IMAGE F3
NO CORRECTION
CORRECTION
(u3, v3, δ3)
AREA P1
X0、X3
TARGET FRAME IMAGE
F3
REFERENCE FRAME IMAGE
F0

Fig.14



● GENERATED PIXEL IMAGE G PIXEL

◇ REFERENCE FRAME IMAGE F0 PIXEL

◈ TARGET FRAME IMAGE F1 PIXEL

◈ TARGET FRAME IMAGE F2 PIXEL

◈ TARGET FRAME IMAGE F3 PIXEL

Fig.15

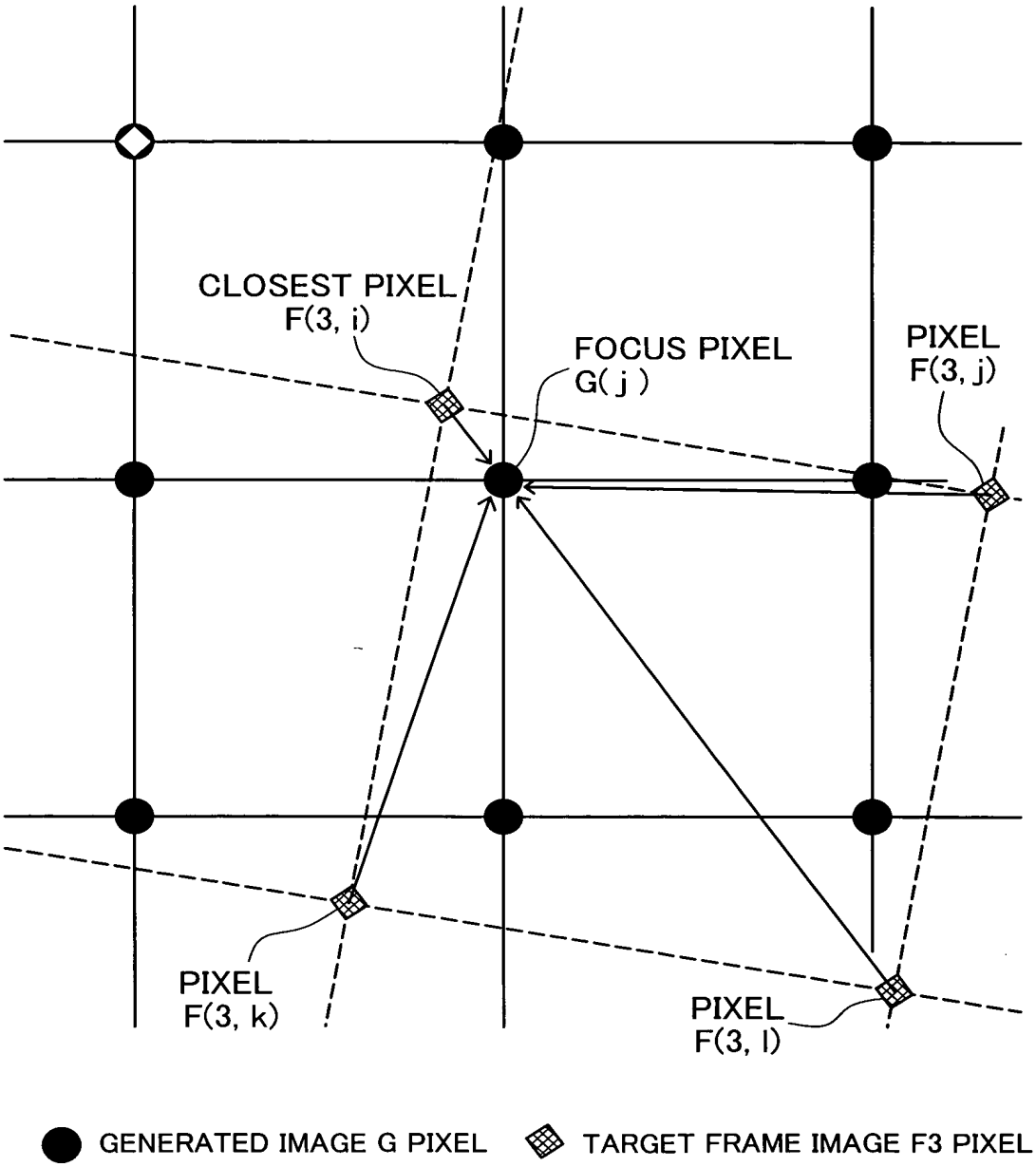

CLOSEST PIXEL
F(3, i)
FOCUS PIXEL
G(j)
PIXEL
F(3, j)
PIXEL
F(3, k)
PIXEL
F(3, l)
GENERATED IMAGE G PIXEL
TARGET FRAME IMAGE F3 PIXEL

Fig.16

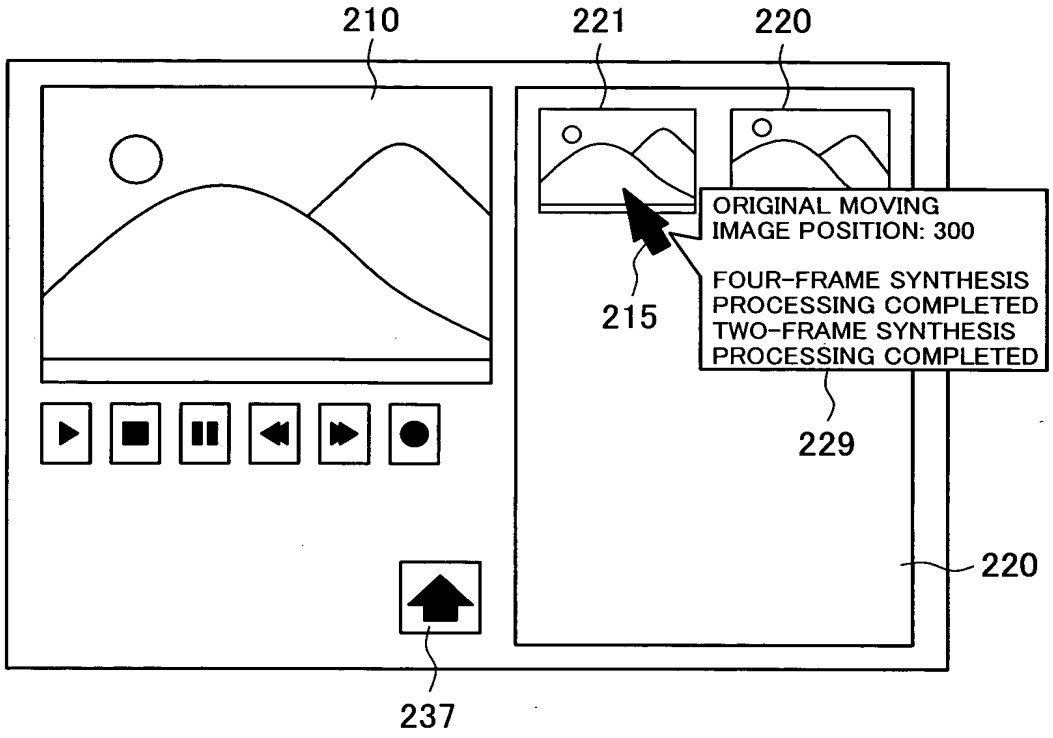

210
221
220
ORIGINAL MOVING IMAGE POSITION: 300
FOUR-FRAME SYNTHESIS PROCESSING COMPLETED
TWO-FRAME SYNTHESIS PROCESSING COMPLETED
215
229
220
237

Fig.17(a)

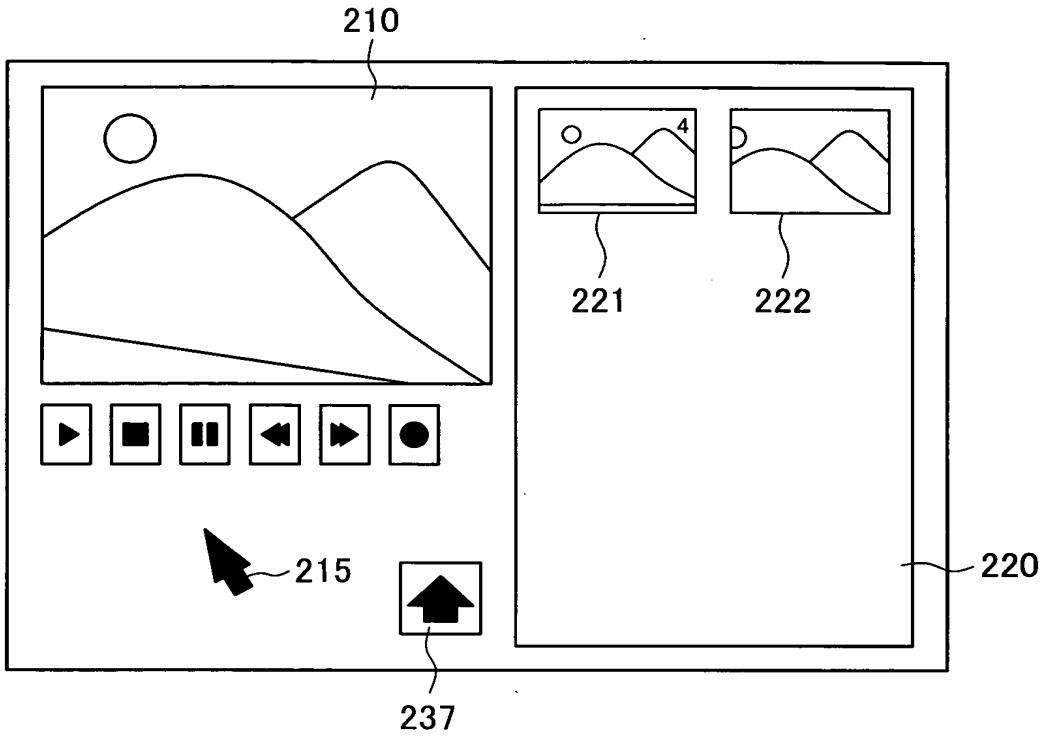
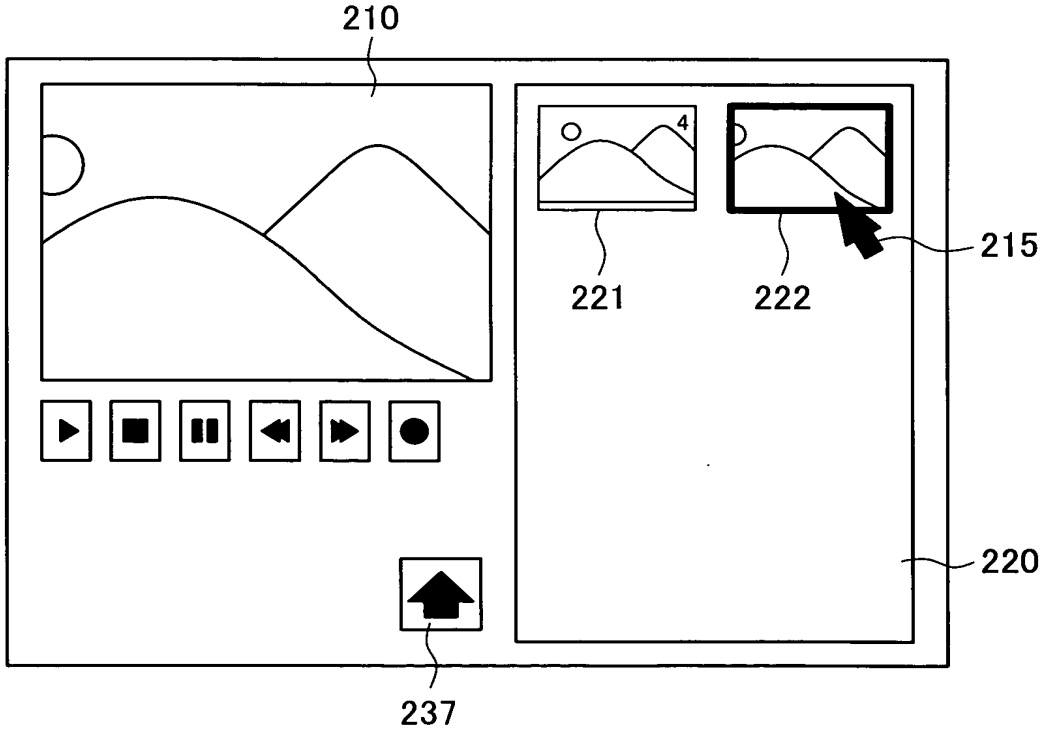



Fig.17(b)